WHAT IS CLAIMED IS:

1. A linear motor configured with a plurality of voice coil-type linear motor units arranged in parallel to each other,

each of the voice coil-type linear motor units comprising:

an outside yoke having a cylindrical hollow portion;

an inside yoke passing through the hollow portion of the outside yoke;

a coil wound around the inside yoke along an axial direction thereof; and

a magnet mounted to the inside of the hollow portion of the outside yoke and magnetized to a single pole in a surface facing the coil,

wherein

ends of the inside yoke are coupled to an adjacent one of the voice coil-type linear motor units by mean of auxiliary yokes,

the outside yokes of the voice coil-type linear motor units adjacent to each other are configured such that inner peripheral surfaces of the magnets are of different magnetic poles,

a closed magnetic path is formed by the inside yokes adjacent to each other, the auxiliary yokes, the outside yokes, and the magnets, and

by feeding current through the coils of the voice coil-type linear motor units adjacent to each other, the outside yokes and the inside yokes are effected to move relative to each other based on magnetic action caused to occur between a magnetic field generated by the closed magnetic path and the coils.

2. A linear motor configured with a plurality of voice coil-type linear motor units arranged in parallel to each other,

each of the voice coil-type linear motor units comprising:

an outside yoke having a cylindrical hollow portion;

an inside yoke passing through the hollow portion of the outside yoke;

a coil mounted to the inside of the hollow portion of the outside yoke and wound along the axial direction of the inside yoke; and

a magnet mounted to the inside yoke and magnetized to a single pole in the surface facing the coil, wherein,

ends of the inside yoke are coupled to another adjacent one of the voice coil-type linear motor units by mean of auxiliary yokes,

the inside yokes of the voice coil-type linear motor units adjacent to each other are configured such that outer peripheral surfaces of the magnets may be of different magnetic poles,

a closed magnetic path is formed by the inside yokes adjacent to each other, the auxiliary yokes, the outside yokes, and the magnets, and

by feeding current through the coils of the voice coil-type linear motor units adjacent to each other, the outside yokes and the inside yokes are effected to move relative to each other based on magnetic action caused to occur between a magnetic field generated by the closed magnetic path and the coils.

3. A linear motor configured with a plurality of voice coil-type linear motor units arranged in parallel to each other, comprising:

inside yokes arranged side by side;

coils separately wound in a plurality of sections around the inside yokes along the respective axial direction thereof; and

outside yokes having cylindrical hollow portions, into which the inside yokes are inserted, and provided with magnets on the insides of the hollow portions correspondingly to the coils separately wound in the plurality of sections, wherein

the magnets are magnetized to a single pole in surfaces facing the coils, and the outside yokes of the voice coil-type linear motor units adjacent to each other are configured such that inner peripheral surfaces of the magnets may be of different magnetic poles,

a closed magnetic path is formed by a plurality of the outside yokes, the inside yoke, and the magnets,

by feeding current through the coils, the outside yokes coupled and the inside yokes coupled are effected to move relative to each other based on magnetic action caused to occur between a magnetic field generated by the closed magnetic path and a magnetic field generated by the coils.

4. A linear motor configured with a plurality of voice coil-type linear motor units arranged in parallel to each other, comprising:

inside yokes arranged side by side;

magnets separately provided in a plurality of sections on the inside yokes along the respective axial directions thereof; and

outside yokes having cylindrical hollow portions, into which the inside yokes are inserted, and having coils wound on the inside of the hollow portions correspondingly to the magnets separately provided in the plurality of sections, wherein

the magnets are magnetized to a single pole in surfaces facing the coils, and are configured such that the magnets of the voice coil-type linear motor units adjacent to each other may be of magnetic poles different from each other,

a closed magnetic path is formed by the outside yokes, the inside yoke, and the magnets,

by feeding current through the coils, the outside yokes coupled and the inside yokes coupled are effected to move relative to each other based on magnetic action caused to occur between a magnetic field generated by the closed magnetic path and a magnetic field generated by the coils.

5. A linear motor, comprising:

a movable unit comprising an outside yoke having a cylindrical hollow portion and an annular magnet fixed so as to cover nearly all surface of the inner peripheral surface of the hollow portion; and

a fixed unit comprising a column-shaped inside yoke and a coil wound around an outer periphery portion of the inside yoke,

wherein

the movable unit and the fixed unit are arranged side by side, respectively in plural pairs, opposite ends of the plurality of the fixed units are coupled by individual auxiliary yokes, and the outside yokes are face-joined to each other such that the inner peripheral surfaces of the magnets

of the movable units adjacent to each other may be of different magnetic poles, and

guide mechanisms for holding nearly uniform gaps between the outer periphery portions of the coils and the inner peripheral surfaces of the magnets are provided between the side of the auxiliary yokes and the outside yokes.

6. A linear motor, comprising:

a movable unit comprising an outside yoke having a cylindrical hollow portion and an annular magnet, fixed so as to cover nearly all surface of the inner peripheral surface of the hollow portion; and

a fixed unit comprising a column-shaped inside yoke and coils separately wound in two sections around the outer periphery portions of the inside yoke,

wherein

the fixed units is arranged side by side, four movable units are mounted to face the coils of four sections such that the inner peripheral surfaces of the magnets adjacent to each other may be of different magnetic poles, and opposite ends of the fixed units are coupled by coupling blocks, and the outside yokes of two sets of the movable units arranged side by side are face-joined to each other, and

the motor further comprises:

holding means for coupling between two face-joined movable units to hold a constant spacing of one movable stroke between them, and

guide mechanisms, provided between the side of the coupling blocks and the outside yokes, for holding uniform gaps between the outer periphery portions of the coils and the inner peripheral surfaces of the magnets.

7. A linear motor, comprising:

a fixed unit comprising an outside yoke having a cylindrical hollow portion and an annular magnet fixed so as to cover nearly all surface of the inner peripheral surface of the hollow portion; and

a movable unit comprising a column-shaped inside yoke and coils wound around the outer periphery portion of the inside yoke,

wherein

the movable unit and the fixed unit are arranged side by side, respectively in plural pairs, opposite ends of the plurality of the fixed units are coupled by individual auxiliary yokes, and the outside yokes are face-joined to each other such that the inner peripheral surfaces of the magnets of the fixed units adjacent to each other may be of different magnetic poles, and

guide mechanisms, provided between the side of the auxiliary yokes and the outside yokes, for holding nearly uniform gaps between the outer periphery portions of the coils and the inner peripheral surfaces of the magnets.

8. A linear motor, comprising:

a fixed unit comprising an outside yoke having a cylindrical hollow portion and an annular magnet fixed so as to cover nearly all surface of the inner peripheral surface of the hollow portion; and

a movable unit comprising a column-shaped inside yoke and coils separately wound in two sections around the outer periphery portion of the inside yoke,

wherein

the movable units are arranged side by side, four fixed units are mounted to face the coils of four sections such that

the inner peripheral surfaces of the magnets adjacent to each other may be of different magnetic poles, and opposite ends of the movable units are coupled by coupling blocks, the outside yokes of two sets of the fixed units arranged side by side are face-joined to each other, and

the motor further comprises,

holding means for coupling between two face-joined movable units and keeping a constant spacing of one movable stroke between them, and

guide mechanisms, provided between the side of the coupling blocks and the outside yokes, for holding nearly uniform gaps between the outer periphery portions of the coils and the inner peripheral surfaces of the magnets.

9. The linear motor according to any one of claims 5 to 8, wherein the magnets are divided into a plurality of parts to be fixed on the inner peripheral surface of the hollow portion.

10. The linear motor according to any one of claims 5 to 8, wherein the magnet is shaped like a plate, and the inside yoke is shaped like a hexagonal or octagonal prism.

11. The linear motor according to any one of claims 5 to 8, wherein the outside yoke is configured by laminating electrical sheets.

12. The linear motor according to any one of claims 5 to 8, wherein the outside yoke is divided into two parts along the radial direction.

13. A linear motor, comprising:

an outside yoke having a plurality of cylindrical hollow portions extending side by side with each other;

a plurality of column-shaped inside yokes passing through the hollow portions of the outside yoke;

coils wound around the inside yokes along an axial direction thereof; and

magnets mounted to the inside of the hollow portions of the outside yoke and magnetized to a single pole in surfaces facing the coils,

wherein

opposite ends of the inside yokes are coupled by auxiliary yokes, the magnets provided in the hollow portions adjacent to each other are arranged such that the inner peripheral surfaces of the magnets may be of different magnetic poles, thus forming a closed magnetic path by the inside yokes, the auxiliary yokes, the outside yokes, and the magnets, and

by feeding current through the coils, the outside yokes and the inside yokes are effected to move relative to each other based on magnetic action caused to occur between a magnetic field generated by the closed magnetic path and the coils.

14. A linear motor, comprising:

an outside yoke having a plurality of cylindrical hollow portion extending side by side with each other;

inside yokes passing through the hollow portions of the outside yoke;

coils mounted to the insides of the hollow portions of the outside yoke and wound along an axial direction of the inside yokes; and

magnets mounted to the inside yokes and magnetized to a single pole in the surfaces facing the coils, wherein

the ends of the inside yokes are coupled by auxiliary yokes,

the inside yokes adjacent to each other are configured such that the outer peripheral surfaces of the magnets may be of different magnetic poles,

a closed magnetic path is formed by the inside yokes adjacent to each other, the auxiliary yokes, the outside yoke, and the magnets, and

by feeding current through the coils, the outside yokes and the inside yokes are effected to move relative to each other based on magnetic action caused to occur between a magnetic field generated by the closed magnetic path and the coils.

15. A linear motor configured with a plurality of voice coil-type linear motor units arranged in parallel to each other, comprising:

inside yokes arranged side by side;

coils separately wound in a plurality of sections around the inside yokes along respective axial directions of the inside yokes; and

outside yokes having a plurality of cylindrical hollow portions extending side by side with each other, into which the inside yokes are inserted, and having magnets provided inside the hollow portions correspondingly to the coils separately wound in the plurality of sections,

wherein

the magnets are magnetized to a single pole in surfaces facing the coils, and the outside yokes of the voice coil-type linear motor units adjacent to each other are configured such

that the inner peripheral surfaces of the magnets may be of different magnetic poles,

a closed magnetic path is formed by a plurality of the outside yokes, the inside yoke, and the magnets, and

by feeding current through the coils, the outside yokes coupled and the inside yokes coupled are effected to move relative to each other based on magnetic action caused to occur between a magnetic field generated by the closed magnetic path and a magnetic field generated by the coils.

16. A linear motor configured with a plurality of voice coil-type linear motor units arranged in parallel to each other, comprising:

inside yokes arranged side by side;

magnets separately provided in a plurality of sections on the inside yokes along respective axial directions thereof; and

outside yokes having cylindrical hollow portions into which the inside yokes are inserted, and having coils wound on the insides of the hollow portions corresponding to the magnets separately provided in the plurality of sections, wherein

the magnets are magnetized to a single pole in surfaces thereof facing the coils, and are configured such that the magnets of the voice coil-type linear motor units adjacent to each other may be of magnetic poles different from each other,

a closed magnetic path is formed by the outside yokes, the inside yokes, and the magnets, and

by feeding current through the coils, the outside yokes coupled and the inside yokes coupled are effected to move relative to each other based on magnetic action caused to

occur between a magnetic field generated by the closed magnetic path and a magnetic field generated by the coils.

17. An X - Y table provided with a linear motor according to any one of claims 1 to 8 and claims 13 to 16.